<u>In the Drawings</u>

Please replace the original Figure 1 with the attached substitute sheet.

No new matter has been introduced.

REMARKS

In the patent application, claims 1-32 are pending. In the office action, all pending claims are rejected.

At section 4, claims 1, 4, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art (*Bradley et al.*, EP 1058383 A2, hereafter referred to as *Bradley*) in view of *Aigner et al.* (U.S. Patent Application Publication No. 2003/0179053 A1, hereafter referred to as *Aigner*).

In rejection claim 1, the Examiner states that *Bradley* discloses a dual-channel passband filter as claimed (Figure 4) except that *Bradley* fails to disclose the filters being lattice filters, but points to *Aigner* to disclose that feature (Figure 4). The Examiner states that it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the lattice filters in *Aigner* into the dual-channel passband filter of *Bradley*.

Applicant respectfully disagrees.

It is respectfully submitted that *Bradley* discloses a dual-channel passband filter having two ladder passband filters 130 and 131 (Figure 4). These two ladder filters 130 and 131 are <u>topologically different</u>. As shown in Figure 4, the passband filter 130 has two shunt elements 109, 107 whereas the passband filter 132 has four shunt elements 121, 123, 125 and 127. In a ladder passband filter, the position of the deep attenuation maximums on both sides of the filter is fixed by the physical material constants. If they are topologically identical, the notches of the two ladder passband filters would not, in general, be significantly different. In real application where one ladder passband filter is used for Tx and the other is used for Rx, the notches in two topologically identical ladder filters usually do not coincide with the required Tx and Rx attenuator profiles. For that reason, one passband filter is usually required to have more resonators than the other. *Bradley* uses five resonators for the Tx signal path and seven resonators in the Rx signal path. Furthermore, the first resonator 105 in passband filter 130 is a series element whereas the first resonator 121 in passband filter 131 is a shunt element toward the common node. As such the phase shifter 134 can be made shorter.

The dual-channel passband filter, according to the present invention, has two lattice filters for use in the Tx and Rx signal paths. In lattice filters, notches can be made differently by changing the areas of the shunt and series resonators. With this insight, the lattice filters in the dual-channel passband filter in the claimed invention can be made topological identical in that each lattice filter has four resonators arranged as two shunt elements and two series elements.

Aigner only discloses using one lattice filter in tandem with a ladder filter in order to eliminate the use of a balun in a balance-to-unbalanced transformer circuit. *Aigner* does not disclose or suggest how to simplify a dual-channel passband filter by using two topologically identical lattice filters.

For the above reasons, *Bradley*, in view of *Aigner*, does not render claim 1 obvious.

As for claims 4, 7 and 8, they are dependent from claim 1 and recite features not recited in claim 1. For reasons regarding claim 1 above, it is respectfully submitted that claims 4, 7 and 8 are also distinguishable over the cited *Bradley* and *Aigner* references.

At section 5, claims 2-3 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Bradley*, in view of *Aigner*, and further in view of *Dailing et al.* (U.S. Patent No. 3,727,154, hereafter referred to as *Dailing*).

In rejecting claim 2, the Examiner cites *Dailing* for disclosing that the first passband filter has a first passband frequency and the second passband has a different second frequency (col. 1, line 61 to col. 2, line 16). Applicant respectfully disagrees.

First, *Dailing* has nothing to do with a dual-channel passband filter having two separate signal paths or ports, each of which has a lattice passband filter.

Second, the crystal filter elements 14, 16 of *Dailing* are resonators fabricated on a quartz crystal wafer. They are monolithic coupled resonator filters. They are not balanced filters and have nothing to do with bulk acoustic resonators.

Third, *Dailing* does not disclose or suggest that the lattice network is used as a <u>balanced</u> filter, wherein two balanced filters are used in two separate signal paths having different passband frequencies.

Dailing is concerned with modifying the filter response in a filter circuit with dual monolithic coupled resonator filters by adding a resistance-capacitance network. In Figure 1 of

Dailing a ladder resistance-capacitance network 15 is coupled between two monolithic dual-coupled crystal filter elements 14, 16. *Dailing* discloses that the resonating portions of each dual-coupled crystal filter elements can be the same or slightly different frequencies, but the frequencies of the mesh in which each resonating portion is connected is the same, so as to define a desired narrow and well-defined passband (col. 2, lines 3-9). While, in one of the embodiments, the resistance-capacitance network has four resistors arranged in a lattice network with each of the resistors being shunted by a capacitor, *Dailing* does not use this lattice network as a balanced lattice filter. In particular, *Dailing* only uses the resistance-capacitance network for changing the shape of the characteristic curve of the bandpass filter circuit from what it would be to closely approximate a Gaussian shape in the passband (col.3, lines 50 – 55). For that reason, the resonant portions of each dual-coupled crystal filter elements can only be slightly different. Otherwise, the frequencies of the mesh cannot be the same. Thus, the fact that the resonant portions of each dual-coupled crystal filter elements can only be slightly different is irrelevant to the claimed invention. The claimed invention has the limitation that the passband frequency in the signal path connected to one port is different from the passband frequency in the signal path connected to a different port.

Fourth, a lattice network with four resistors, each of which is shunted by a capacitor is a high-loss circuit and, therefore, <u>is not suitable</u> for use as a balanced filter. A person skilled in the art would not be motivated to combine the high-loss circuit in *Dailing* with the ladder-type bulk acoustic filters in *Bradley* and *Aigner*.

For the above reasons, *Bradley*, in view of *Aigner*, and further in view of *Dailing*, fails to render claim 2 obvious. Furthermore, claim 2 is dependent from claim 1 and recites features not recited in claim 1. For reasons regarding claim 1 above, claim 2 is also distinguishable over the cited *Bradley*, *Aigner* and *Dailing* references.

At section 6, claims 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art (*Bradley*) in view of *Aigner*, and further in view of *Ella* (U.S. Patent No. 6,081,171). The Examiner points to *Ella* for disclosing that at least one of the acoustic resonators is a bridge-type bulk acoustic wave device.

It is respectfully submitted that, claims 5 and 6 are dependent from claim 1 and recite features not recited in claim 1. For reasons regarding claim 1 above, claims 5 and 6 are also distinguishable over the cited *Aigner*, *Ella* and *Bradley* references.

At section 7, claims 12, 22-24, 28 and 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Aigner* in view of *Bradley*.

In rejecting claim 12, the Examiner uses the same reasons as those in rejecting claim 1. It is respectfully submitted that *Bradley* discloses a dual-channel passband filter having two <u>topologically different</u> ladder filters.

Aigner only discloses using one lattice filter in tandem with a ladder filter in order to eliminate the use of a balun in a balance-to-unbalanced transformer circuit. *Aigner* does not disclose or suggest how to simplify a dual-channel passband filter by using two topologically identical lattice filters.

For the above reasons, *Bradley*, in view of *Aigner*, does not render claim 12 obvious.

As for claims 22-24, 28, 31 and 32, they are dependent from claim 12 and recite features not recited in claim 12. For reasons regarding claim 12 above, it is respectfully submitted that claims 22-24, 28, 31 and 32 are also distinguishable over the cited *Bradley* and *Aigner* references.

At section 8, claims 13, 14, 20, 21 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Aigner*, in view of *Bradley*, and further in view of *Dailing*.

In rejecting claims 13, 14, 20, 21 and 25-27, the Examiner uses the same reasons as those in rejecting claim 2.

It is respectfully submitted that that *Bradley* discloses a dual-channel passband filter having two <u>topologically different</u> ladder filters.

Aigner only discloses using one lattice filter in tandem with a ladder filter in order to eliminate the use of a balun in a balance-to-unbalanced transformer circuit. *Aigner* does not disclose or suggest how to simplify a dual-channel passband filter by using two topologically identical lattice filters.

Dailing has nothing to do with a dual-channel passband filter having two separate signal paths, each of which has a lattice passband filter. The lattice network with four resistors, each of

which is shunted by a capacitor is a high-loss circuit as used in *Dailing* is not suitable for use as a balanced filter. A person skilled in the art would not be motivated to combine the teaching in *Dailing* with the ladder-type bulk acoustic filters in *Bradley* and *Aigner.*

For the above reasons, *Bradley*, in view of *Aigner*, and further in view of *Dailing*, fails to render claims 13, 14, 20, 21 and 25-27 obvious. Furthermore, claims 13, 14, 20, 21 and 25-27 are dependent from claim 12 and recites features not recited in claim 12. For reasons regarding claim 12 above, claims 13, 14, 20, 21 and 25-27 are also distinguishable over the cited *Bradley*, *Aigner* and *Dailing* references.

At section 9, claims 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Bradley* in view of *Aigner* and further in view of *Franca-Neto* (U.S. Patent No. 6,721,544). The Examiner cites *Franca-Neto* for disclosing a transmitter and a receiver.

It is respectfully submitted that claims 15-19 are depending from claim 12 and recite features not recited in claim 12. For reasons regarding claim 12 above, claims 15-19 are also distinguishable over the cited *Dailing* and *Franca-Neto* references and the admitted *Bradley* reference.

At section 10, claims 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Aigner* in view of *Bradley*, and further in view of *Ella* (U.S. Patent No. 6,081,171). The Examiner points to *Ella* for disclosing that at least one of the acoustic resonators is a bridge-type bulk acoustic wave device.

It is respectfully submitted that claims 29 and 30 are depending from claim 12 and recite features not recited in claim 12. For reasons regarding claim 12 above, claims 29 and 30 are also distinguishable over the cited *Bradley*, *Ella* and *Bradley* references.

CONCLUSION

Claims 1-32 are allowable. Early allowance of all pending claims is earnestly solicited.

Respectfully submitted,

Ken Lao

Kenneth Q. Lao
Attorney for the Applicant
Registration No. 40,061

WARE, FRESSOLA, VAN DER SLUYS
& ADOLPHSON LLP
Bradford Green, Building Five
755 Main Street, P.O. Box 224
Monroe, CT 06468
Telephone: (203) 261-1234
Facsimile: (203) 261-5676
USPTO Customer No. 004955

ANNOTATED MARKED-UP DRAWING

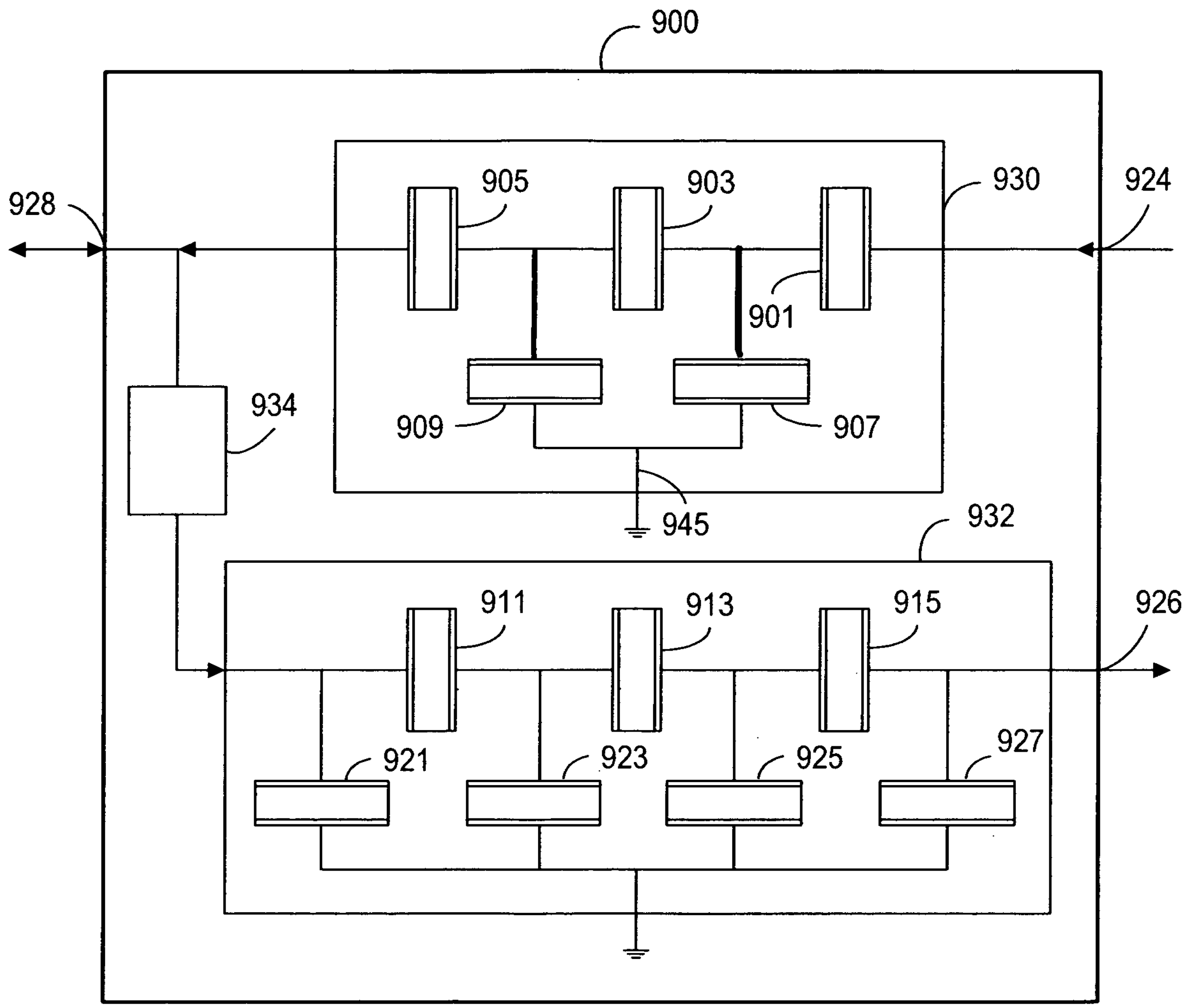

FIG. 1
(Prior Art)